5. Assessment of the Deepwater Flatfish Stock in the Gulf of Alaska (Executive Summary)

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5.1 Introduction

In 2006, the deepwater flatfish complex (consisting of Dover sole, Greenland turbot and deepsea sole) has been moved to a biennial stock assessment schedule to coincide with new survey data. A discussion at the September 2006 Groundfish Plan Team meetings concluded the following two important points for updating information in off-year assessments for species in Tier 3 or higher:

1) Anytime the assessment model is re-run and presented in the SAFE Report, a full assessment document **must** be produced.
2) The single-species projection model **may** be re-run using new catch data without re-running the assessment model.

Thus, on alternate (even) years, parameter values from the previous year's assessment model and total catch information for the current and previous year are used to make projections via the single species projection model for the following two years and to recommend ABC levels for those years.

Dover sole is assessed using an age-structured model and Tier 3 determination. Because no new survey data was available this year, option 2 above was followed to update information for Dover sole for 2010. Thus, the single species projection model was run using parameter values from the accepted 2009 assessment model (Stockhausen et al. 2009[1]), together with updated catch information for 2009 and 2010, to predict stock status for Dover sole in 2011 and 2012 and to make single-species ABC and OFL recommendations for those years. Greenland turbot and deepsea sole fall under Tier 6. Because species-level ABC's and OFL's for Tier 6 species are based on historical catch levels, these quantities cannot be updated. Consequently, as in previous years (Stockhausen et al. 2009[1]), the species-level ABC is 179 t for Greenland turbot while the species-level OFL is 238 t for both 2011 and 2012. For deepsea sole, the ABC is 4 t and OFL is 6 t. The ABC for the complex is the sum of the single species ABC's and the OFL for the complex is the sum of the single species OFL's.

5.2 Updated catch and projection

New information available to update the Dover sole projection model consists of the total Dover sole catch for 2009 (458 t) and the current catch for 2010 (457 t as of Sept. 25, 2010). To run the projection model to predict ABC's for 2011 and 2012, estimates are required for the total catches in 2010 and 2011. The final catch for 2010 was estimated by dividing the current catch by the ratio of the catch in the same week in 2009 as the current catch (week 39) to the final 2009 catch. The estimated final catch for 2010 (514 t) was also used as the estimate for the final 2011 catch. Based on the updated projection model results, the recommended complex-level ABC's for 2011 and 2012 are 6,305 t and 6,486 t, respectively. The new ABC recommendation for 2011 is similar to that recommended for 2011 using last year's full assessment model (6,325 t). The principal reference values are shown in the following table, with the recommended values in bold:

[1]Stockhausen, W., M. Wilkins and M. Martin. 2009. 5. Assessment of the Deepwater Flatfish Stock in the Gulf of Alaska. In: Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska. North Pacific Fishery Management Council, PO Box 103136, Anchorage, AK. http://www.afsc.noaa.gov/REFM/docs/2009/GOAdeepflat.pdf.

Species	Quantity/Status	Last year (2009 Assessment) 2010	Last year (2009 Assessment) 2011	This year (2010 Update) 2011	This year (2010 Update) 2012
Dover sole	M (natural mortality)	0.085	0.085	**0.085**	**0.085**
	Specified/recommended tier	3a	3a	**3a**	**3a**
	Total biomass (Age 3+; t)	89,682	89,870	**89,691**	89,728
	Female Spawning Biomass (t)	32,218	32,673	**32,577**	32,910
	$B_{100\%}$	35,622	35,622	**35,622**	35,622
	$B_{40\%}$	14,249	14,249	**14,249**	14,249
	$B_{35\%}$	12,468	12,468	**12,468**	12,468
	$F_{OFL} = F_{35\%}$	0.149	0.149	**0.149**	0.149
	max $F_{ABC} = F_{40\%}$	0.119	0.119	**0.119**	0.119
	recommended F_{ABC}	0.119	0.119	**0.119**	0.119
	Specified/recommended OFL (t)	7,436	7,603	**7,579**	7,802
	Specified/recommended ABC (t)	6,007	6,142	**6,122**	6,303
	Is the stock being subjected to overfishing?	no	no	**no**	no
	Is the stock currently overfished?	no	no	**no**	no
	Is the stock approaching a condition of being overfished?	no	no	**no**	no
Greenland turbot	**Tier**	**6**	**6**	**6**	**6**
	Specified/recommended OFL (t)	238	238	**238**	238
	Specified/recommended ABC (t)	179	179	**179**	179
Deepsea sole	**Tier**	**6**	**6**	**6**	**6**
	Specified/recommended OFL (t)	6	6	**6**	6
	Specified/recommended ABC (t)	4	4	**4**	4
Entire complex	Specified/recommended OFL (t)	7,680	7,847	**7,823**	8,046
	Specified/recommended ABC (t)	6,190	6,325	**6,305**	6,486

5.3 Area Apportionment

The recommended ABC area apportionment percentages are identical to last year, because there is no new survey information. The following table shows the recommended ABC area apportionments for 2011-12:

Quantity	Species	Western Gulf	Central Gulf	West Yakutat	Southeast Outside	Total
Area apportionment	Dover sole	6.6%	47.0%	33.9%	12.5%	100.0%
	Greenland turbot	68.2%	22.3%	5.0%	4.5%	100.0%
	Deepsea sole	0.0%	100.0%	0.0%	0.0%	100.0%
2011 ABC (t)	Dover sole	407	2,875	2,074	766	6,122
	Greenland turbot	122	40	9	8	179
	Deepsea sole	0	4	0	0	4
	Total	529	2,919	2,083	774	6,305
2012 ABC (t)	Dover sole	419	2,960	2,135	789	6,303
	Greenland turbot	122	40	9	8	179
	Deepsea sole	0	4	0	0	4
	Total	541	3,004	2,144	797	6,486

5.4 Research Priorities

The use of alternative selectivity functions in the assessment model is an area of active research. Data from the groundfish survey suggests that Dover sole in the path of the survey trawl exhibit a probability of capture that declines at larger sizes, rather than increasing to reach an asymptote as is generally

assumed. Differences in depth coverage among the groundfish surveys used in the assessment add a further complication to the use of "standard" selectivity curves such as the logistic.

A new assessment model is being developed that incorporates length-based approaches to fishery and survey selectivity, size-based natural mortality, environmental predictors of recruitment or catchability (e.g., temperature), density-dependent stock-recruit functions, multiple fisheries and surveys, and temporally-varying parameter values. The new model will allow the incorporation of ADFG surveys into the assessment model, as has been suggested by the SSC.

5.5 Summaries for the Plan Team

Species	Year	Biomass[1]	OFL[2]	ABC[2]	TAC[2]	Catch[3]
Deepwater flatfish	2009	133,025	11,578	9,168	9,168	466
	2010	89,682	7,680	6,190	6,190	457
	2011	89,691	7,823	6,305		
	2012	89,728	8,046	6,486		

[1]Age 3+ biomass for Dover sole (only) estimated when ABC and OFL were determined (2009, 2010) or using the updated projection model (2011, 2012). Biomass estimates for Greenland turbot and deepsea sole are considered unreliable and are not included.
[2]As published in the Federal Register (2009, 2010 for the deepwater flatfish complex) or as recommended based on the projection model (2011, 2012).
[3]As of Sept. 25, 2010.

Stock/ Assemblage	Area	2010 OFL[1]	2010 ABC[1]	2010 TAC[1]	2010 Catch[2]	2011 OFL[3]	2011 ABC[3]	2012 OFL[3]	2012 ABC[3]
Deepwater flatfish	W	--	521	521	2	--	529	--	541
	C	--	2,865	2,865	445	--	2,919	--	3,004
	WYAK	--	2,044	2,044	7	--	2,083	--	2,144
	SEO	--	760	760	3	--	774	--	797
	Total	7,680	6,190	6,190	457	7,823	6,305	8,046	6,486

[1]As published in the Federal Register for the deepwater flatfish complex.
[2]Catch for the deepwater flatfish complex, as of Sept. 25, 2010.

Note: Values published in the Federal Register are available for:
2009: http://www.fakr.noaa.gov/sustainablefisheries/specs09_10/goatable1.pdf
2010: http://www.fakr.noaa.gov/sustainablefisheries/specs10_11/goatable1.pdf
2011: http://www.fakr.noaa.gov/sustainablefisheries/specs10_11/goatable2.pdf

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